In the Claims:

Please amend claims 25 and 27-31. The claims are as follows:

1. (Original) A method for diagnosing failing scan chains, the method comprising the steps of:

identifying logic paths from a target scan chain to at least one observation scan chain until a pre-specified selection criterion is achieved;

activating the identified logic paths so as to capture the contents of associated target latches in the target scan chain into observation latches in at least one observation scan chain; and

analyzing the contents of the observation latches to determine defect ranges in the target scan chain.

2. (Original) The method of claim 1, wherein at least one latch of the target scan chain is not observed from any other scan chain.

3. (Original) The method of claim 1, wherein the step of identifying logic paths from the target scan chain comprises the step of identifying logic paths from the target scan chain to at least two observation scan chains.

4. (Original) The method of claim 1, wherein the identified logic paths are identified in order of increasing logic path complexity.

5. (Original) The method of claim 1, wherein the step of identifying the logic paths from the target scan chain to the at least one observation scan chain until the pre-specified selection

criterion is achieved comprises the step of identifying simple logic paths from the target scan

chain to the at least one other observation scan chain, wherein simple logic paths are defined as

logic paths with no side inputs.

6. (Original) The method of claim 5, wherein the step of identifying the logic paths from the

target scan chain to the at least one observation scan chain until the pre-specified selection

criterion is achieved further comprises the step of identifying complex logic paths from the target

scan chain to the at least one observation scan chain, if the pre-specified selection criterion is not

achieved with the identified simple logic paths.

7. (Original) The method of claim 1, wherein the pre-specified selection criterion is specified in

terms of the maximum value of the largest distance in latches between two adjacent target

latches in the target scan chain.

8. (Original) The method of claim 1, wherein the step of analyzing the contents of the

observation latches to determine defect ranges in the target scan chain comprises the steps of:

measuring the contents of the observation latches; and

comparing only the contents of the observation latches to expected data.

9. (Withdrawn) A method of constructing scan chains to enable diagnosing failing scan chains,

the method comprising the steps of:

identifying simple logic paths from first target latches in a target scan chain to at least one

other observation scan chain; and

optimizing the locations of the first target latches in the target scan chain.

10. (Withdrawn) The method of claim 9, wherein the step of optimizing the locations of the first target latches in the target scan chain comprises reordering the first target latches in the target scan chain such that the largest distance in terms of latches between two adjacent target latches in the target scan chain is reduced.

11. (Withdrawn) The method of claim 9, wherein the step of optimizing the locations of the first target latches in the target scan chain comprises moving at least one of the first target latches to a location in another scan chain.

12. (Withdrawn) The method of claim 9, further comprising the steps of:

identifying complex logic paths from second target latches in the target scan chain to at least one other observation scan chain, if a pre-specified selection criterion has not been achieved with the first target latches after location optimization; and

optimizing the locations of the first and second target latches in the target scan chain.

13. (Withdrawn) The method of claim 12, wherein the step of optimizing the locations of the first and second target latches in the target scan chain comprises the step of reordering the first and second target latches in the target scan chain such that the largest distance in terms of latches between two adjacent target latches in the target scan chain is reduced.

14. (Withdrawn) The method of claim 12, wherein the step of optimizing the locations of first

and second target latches in the target scan chain comprises the step of reordering the first and second target latches in the target scan chain such that the largest distance in terms of latches between two adjacent target latches in the target scan chain is minimized.

15. (Withdrawn) The method of claim 12, further comprising the steps of:

adding at least a third target latch into the target scan chain; and

adding a logic path connecting the third target latch to an existing observation latch in another scan chain.

16. (Withdrawn) The method of claim 12, further comprising the steps of:

identify an existing latch in the target latch as a third target latch; and

adding at least an observation latch into another scan chain; and

adding a logic path from the third target latch to the added observation latch.

17. (Withdrawn) The method of claim 12, further comprising the steps of:

adding at least one third target latch into the target scan chain;

adding at least an observation latch in another scan chain; and

adding a logic path from the third target latch to the added observation latch.

18. (Withdrawn) The method of claim 17, further comprising the step of optimizing the locations of the observation latches associated with the at least one third target latch.

19. (Withdrawn) The method of claim 12, wherein the step of optimizing the locations of the first

and second target latches in the target scan chain comprises the step of, if any complex logic path is identified, moving at least a target latch associated with the side input of the complex logic path to a location in another scan chain other than the target scan chain.

20. (Withdrawn) The method of claim 12, wherein the step of optimizing the locations of the first and second target latches in the target scan chain comprises the step of moving at least one latch of the first and second target latches from the target scan chain to another scan chain.

21. (Withdrawn) A method of constructing scan chains to enable diagnosing failing scan chains, the method comprising the steps of:

identifying logic paths from target latches in a target scan chain to observation latches in at least one other observation scan chain; and

optimizing the locations of the observation latches within the other scan chains.

22. (Withdrawn) The method of claim 21, wherein the step of optimizing the locations of the observation latches in the at least one other scan chain comprises locating the observation latches associated with a target scan chain within a subset of the other scan chains.

23. (Withdrawn) The method of claim 21, wherein the step of optimizing the locations of the observation latches in the at least one other scan chain comprises the step of reordering the observation latches in the at least one other scan chain such that the largest distance in terms of latches between two adjacent observation latches is reduced.

24. (Withdrawn) The method of claim 21, wherein the step of optimizing the locations of the observation latches in the other scan chains comprises the step of reordering the observation latches in the other scan chains such that the observation latches are located close to the scanout of the scan chain.

25. (Currently amended) A method for diagnosing failing scan chains, the method comprising the steps of:

identifying M target latches in a target scan chain, M being a positive integer;

identifying N logic paths, N being a positive integer,

wherein each logic path of the N logic paths is electrically coupled to at least a target latch of the M target latches; and

identifying P observation latches, P being a positive integer,

wherein each observation latch of the P observation latches is electrically coupled to at least one target latch of the M target latches via at least one logic path of the N logic paths, and

wherein a content of each observation latch of the P observation latches is a function of contents of target latches of the M target latches which the each observation latch is electrically coupled to.

~~identifying at least one target latch in a target scan chain;~~

~~identifying at least one logic path electrically coupled to the at least one target latch; and~~

~~identifying at least one observation latch electrically coupled to the at least one logic path.~~

26. (Original) The method of claim 25, further comprising the step of running test patterns against the target scan chain.

27. (Currently amended) The method of claim 26, further comprising the step of activating <u>the N logic paths</u> ~~the at least one identified logic path~~ so as to capture ~~the~~ contents of the <u>M target latches</u> ~~at least one target latch~~ in the target scan chain into the <u>P observation latches.</u>~~at least one observation latch.~~

28. (Currently amended) The method of claim 27, further comprising the step of analyzing ~~the~~ contents of the <u>P observation latches</u> ~~at least one observation latch~~ to determine defect ranges in the target scan chain.

29. (Currently amended) The method of claim 25, wherein <u>two observation latches of the P observation latches reside on two different scan chains.</u> ~~the step of identifying at least one observation latch electrically coupled to the at least one logic path comprises the step of identifying at least two observation latches being on at least two different scan chains and electrically coupled to the at least one logic path.~~

30. (Currently amended) The method of claim 25, further comprising the steps of:

<u>adding Q target latches into the target scan chain, Q being a positive integer; and</u>

<u>for each target latch of the Q target latches, adding a logic path connecting the each target latch to an observation latch of an observation scan chain which is different from the target scan chain.</u>

~~adding at least one target latch into the target scan chain; and~~

~~adding at least one logic path connecting the at least one target latch to at least one existing observation latch in at least one other scan chain.~~

31. (Currently amended) The method of claim 25, further comprising the steps of:

<u>determining a correspondence between (i) states of the M target latches and (ii) expected states of the P observation latches; and</u>

<u>constructing the correspondence into a lookup table.</u>

~~constructing a correspondence between the at least one target latch, a target latch state, the at least one observation latch, and an expected observation latch state; and~~

~~compiling the correspondence into a lookup table.~~